## REMARKS

Reconsideration and withdrawal of the final rejection and allowance of the Application are respectfully requested for at least the following reasons.

Claims 1-7 and 9-20 remain pending.

Applicants note with appreciation that the rejection of claims 1-7, 9-12, 14 and 17-20 as unpatentable over Komatsu alone and the rejection of claims 13, 15 and 16 as unpatentable over Komatsu in view of Barry have been withdrawn. It is respectfully submitted, however, that the remaining grounds for rejection should also be withdrawn.

Claims 1-7, 9-12, 14 and 17-20 remain rejected under 35 U.S.C. § 103(a), as unpatentably obvious over van der Aalst et al (US 5,504,268) in view of Komatsu et al (US 3,662,015). Applicants respectfully disagree and request reconsideration and withdrawal of this rejection.

With regard to van der Aalst et al (hereafter US 268) the Examiner urges that the comparative examples in US 268 utilize pressures within the claimed range and show that phenylacetylene in a styrene feed is hydrogenated at these pressures.

However, it is respectfully pointed out that the Comparative Examples were carried out using a palladium catalyst and not a nickel catalyst. Therefore, the Examples and Comparative Examples do not provide any evidence that the hydrogenation of phenylacetylene in a styrene-containing liquid medium in the presence of hydrogen gas would proceed at a temperature between about 15 and 50 °C and an hydrogen pressure between 1 and 301 bar using a sulfur-free nickel catalyst.

Furthermore, the Comparative Example 1 in Table 2 shows that at a hydrogen pressure ($pH_2$) of 2 bar the styrene loss is as high as 2000 ppm. Even at 1 bar, using the palladium catalyst, the loss of styrene (see Comparative Examples 1 and 5 in Table 1) was as high as 450 ppm or 550 ppm.

In view of these results for the preferred palladium catalyst the practitioner would not have been motivated to operate the selective hydrogenation of phenylacetylene using a nickel catalyst at a hydrogen pressure in the range between 1 and 301 bar and would not have had an expectation of successfully carrying out the reaction within this pressure range. It should, in this regard, be specifically noted that the prevention of "substantial loss of vinyl-aromatic compound" [*e.g.*, styrene] is the objective of the patentees.

The mere disclosure of nickel as a potential selective hydrogenation catalyst does not provide any evidence of the operability of nickel catalyst at a hydrogen partial pressure between 1 and 301 bar. Again, the practitioner, taking into considering the performance of the preferred palladium catalyst at pressure of 1 bar and 2 bar, would be taught away from and dissuaded against using a nickel catalyst at these pressures.

Quite surprisingly and, especially in view of US 268, unexpectedly, the examples in the specification of this application demonstrate that there is a net gain in styrene content using a nickel catalyst to selectively hydrogenate phenylacetylene in a styrene-containing liquid medium when the reaction is carried out at a temperature between about 15 and 50 °C and an hydrogen pressure between 1 and 301 bar even at high conversions of phenylacetylene (see, Table 2, page 12). According to the disclosure of US 268 a net styrene gain was not observed except in the case of Run no. 8 of Example 1 where a hydrogen pressure of 0.01 bar was used.

Van der Aalst, US 268 does <u>not</u> stand for the proposition and does not disclose or suggest that it is possible to achieve selective hydrogenation of aromatic acetylene compounds using a nickel catalyst "wherein the hydrogenation is carried out at a temperature between about 15 and about 50 °C and an hydrogen pressure between 1 and 301 bar." The problem addressed by US 268 is not simply to hydrogenate phenylacetylene but to do so under conditions which will minimize the loss of styren. This is disclosed to be accomplished only at a hydrogen pressure of from about 0.001 to about 0.05 bar.

Therefore, based on the disclosure of US 268 the process set forth in the present claims would not have been obvious at the time the application was filed.

The deficiencies of the disclosure of US 268 are not obviated by the disclosure of Komatsu et al (hereafter US 015).

With regard to US 015 the Examiner disagreed with Applicant's position that this disclosure is not relevant to the selective hydrogenation of phenylacetylene because phenylacetylene "falls within the general class of acetylenic hydrocarbons disclosed" by US 015.

Again, Applicants respectfully submit that the Examiner has misconstrued US 015 and the practitioner of ordinary skill in the art would not have been motivated by US 015 to modify the disclosure of US 268. In any case, nothing in the disclosure of US 015 would have led the practitioner to operate the process of US 268 with a nickel catalyst at a pressure above about 0.05 bar.

The Examiner has not refuted that the disclosure of US 015 is concerned with preventing double bond migration of mono-olefinic hydrocarbons in selective hydrogenation. Nor has the Examiner refuted that double bond migration is not a relevant concern in the selective hydrogenation of phenylacetylene to styrene. Nor has the Examiner refuted that the only exemplification of acetylenic hydrocarbons in the US 015 patent does not include phenylacetylene and that the disclosure of the monoolefin hydrocarbons does not include styrene. All that is disclosed is butenes containing $C_4$-diolefins and/or $C_{1-4}$ acetylenes (*see, e.g.,* column 1, lines 50-57, 66-72; column 5, lines 20-25). See also Table 4, column 6 for vinyl acetylene.

The disclosure which allegedly encompasses or even contemplates phenylacetylene is simply not apparent. At column 3, line 74 to column 4, line 1, it is stated that the "hydrocarbon feed may contain hydrocarbons having up to 16 carbon atoms." However, with respect to the polyunsaturated hydrocarbons the disclosure at column 4, lines 1-4 is that the "polyunsaturated hydrocarbons are poly-olefinic hydrocarbons (e.g., di-olefins, tri-olefins and the like) and/or acetylenic hydrocarbon (e.g. alkynes, alkenynes)." Thus, there is no explicit disclosure encompassing phenylacetylene and certainly none which suggests that the disclosure is relevant to a hydrocarbon feed containing phenylacetylene and styrene. Again, no aromatic hydrocarbons and no hydrocarbons with only vinyl unsaturation ($C_2$ chain) are set forth in the disclosure. The entire objective of preventing double bond migration is not an issue or problem for mixtures of phenylacetylene and styrene.

Accordingly, the practitioner would not have had any motivation or incentive to even consider the disclosure of US 015 as offering any useful information for selective hydrogenation of phenylacetylene or any other problem addressed in US 268.

More particularly, the disclosure of US 015 is concerned with preventing double bond migration (*i.e.,* isomerization) from occurring in addition to the desired hydrogenation and, specifically, the following representative reactions:

1. the desired hydrogenation:

$R_A$-$C_1$=$C_2$-$C_3$=$C_4$-$R_B$ → $R_A$-$C_1$-$C_2$-$C_3$=$C_4$-$R_B$

2. undesired isomerization (double bond migration)

$R_A$-$C_1$-$C_2$-$C_3$=$C_4$-$R_B$ → $R_A$-$C_1$-$C_2$=$C_3$-$C_4$-$R_B$.

Clearly, the person of ordinary skill in the art would immediately recognize that the prevention of isomerization by double bond migration does not apply to styrene or phenylacetylene, both of which include only $C_2$ unsaturated groups.

Conversely, one skilled in the art having the disclosure of US 015 would not be taught anything about the selectivity of the hydrogenation of the acetylene group of phenylacetylene relative to the hydrogenation of the vinyl group of styrene for any of the catalysts or any of the operating conditions disclosed in US 015. US 015 simply does not address the problem to which the disclosure of US 268 is concerned.

Moreover, there is nothing in the disclosure of US 015 which would motivate the practitioner, even if using a nickel catalyst, to carry out the process of US 268 at anything other than a hydrogen pressure from about 0.001 to about 0.05 bar.

Thus, even forcibly combining the disclosures of US 015 with US 268 would still not lead to the claimed embodiment of Applicant's invention.

Accordingly, it is respectfully submitted that it is only with the benefit of the hindsight provided in the present application that the practitioner would find any motivation to selectively apply the disclosure of US 015 to the disclosure of US 268 to arrive at a process as claimed herein.

Therefore, for at least the above reasons, it is respectfully submitted that it is not proper to combine the disclosures of US 268 and US 015 or that if combined the practitioner would not arrive at the subject matter of the rejected claims.

Therefore, withdrawal of this ground of rejection is respectfully requested.

For at least the same reasons as above, the rejection of claims 13, 15 and 16 as unpatentable over US 268 and US 015 in further view of Barry (US 2,511,453) should also be withdrawn.

Still further, if the practitioner were to apply the disclosure of Barry to the process of US 268 the result would be a partially sulfided, reduced nickel oxide catalyzed reaction and this would still not lead to the embodiment of the invention which is under consideration.

Accordingly, it is respectfully submitted that the Examiner should not sustain this rejection.

Therefore, withdrawal of the rejection of claims 13, 15 and 16 is respectfully requested.

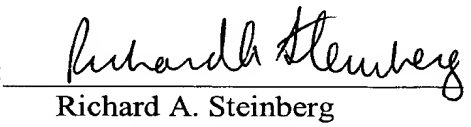
In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

Pillsbury Winthrop LLP

By: 

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